

Peter Henry Rose

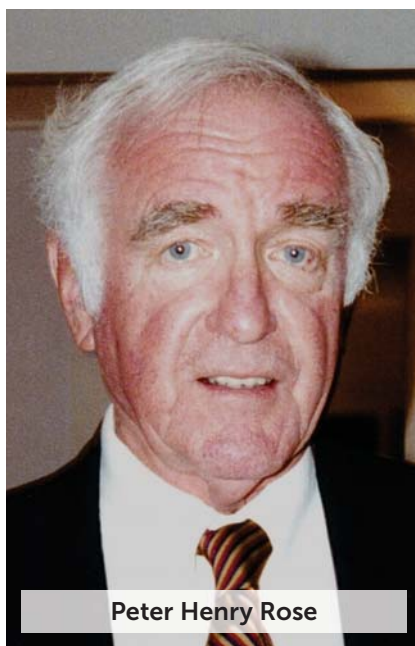
Known as the father of ion implantation technology, Peter Henry Rose died peacefully at his home in Rockport, Massachusetts, on 23 March 2017.

Peter was born on 16 January 1925 in Lincoln, UK; his father was a ship builder. For many years he and his family lived on the Isle of Wight off the UK's south coast. That introduction to country life, with water as a central part, greatly influenced his life and lifestyle. He was for many years an avid sculler on the Charles River in Boston; later he loved sailing his 18-foot catamaran at high speed and on one hull across Lake Sebago in Maine. He also was an enthusiastic skier; on one occasion, while giving a technical paper to an international audience in the Alps, he wore his ski boots so that he would not lose a single moment on the slopes.

Peter received a PhD in nuclear physics from the University of London. Without any instruction, he also was given an adjunct divinity degree, which gave him great amusement throughout his life.

Peter's first job after graduation was at Frank Whittle's innovative turbojet-engine research laboratory. Then, as a Fulbright scholar and research associate, he spent two years at MIT. Peter returned to the UK in 1954 before emigrating permanently to the US in 1956 to join a new and innovative company, High Voltage Engineering Corp. HVEC was dedicated to building large particle accelerators for fundamental nuclear structure research. During his 15-year tenure there, he worked closely with one of its founders, Robert Van de Graaff, and rose to be director of its research laboratory. As well as improving the performance of the machines, Peter was author or coauthor of more than 50 peer-reviewed technical papers.

In 1968, while at HVEC, Peter was asked to build a much smaller accelerator to be used for semiconductor device development at Fairchild Semiconductor. At that time, the desired junction doping of a transistor was achieved by thermal diffusion of dopants into the substrate. That resulted in devices with a distribution of threshold voltages from which those with the desired operating voltage were sorted, and it led to a low



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product yield. Using ion implantation made the threshold voltage precise and resulted in a 100% yield. Unfortunately, the HVEC machine used the existing technology, which had the dopant-ion selection magnet at ground potential after the ion acceleration stage. That configuration resulted in a machine that was nearly 11 meters long; although useful for research, it was quite unsuitable for a production setting.

That experience was the inspiration for Peter's invention of a radically different compact accelerator design, with the selection magnet placed prior to acceleration. Almost no one in the scientific or technical community believed the arrangement could work. But the ion implanter design continues to be used worldwide by semiconductor factories.

In 1971 Peter chose that risky design for the product of his first start-up company, Extrion Corp, which grew to employ 1500 people; it was acquired by Varian in 1975 and still exists today as a division of Applied Materials. The repetitive reproduction of the ion implanters required standard manufacturing procedures that were not in line with Peter's entrepreneurial talents, and he left Varian in 1976 to form his second start-up, Nova Associates (now Axcelis Corp). The company grew rapidly and created an innovative high-current ion implanter. Peter also contributed to the start-up and operation of a subsidiary, Sumitomo Eaton Nova, because sales to

semiconductor fabrication factories were particularly strong in Japan at the time. Additionally, he helped colleagues found or agreed to serve as a director of several other start-ups, including Ibis Technology and Passport Systems.

Peter was a superb leader, which contributed to his being an outstanding entrepreneur. People loved to work with him because they trusted and believed in him. He created a wonderful environment that didn't seem like work because it was so much fun. Customers knew he would make good on his promises. Because of his integrity and reputation, Peter was often able to sell complex ion implanters based on just a simple concept sketch. For the same reason, he was also able to convince investors to support the development of his numerous innovations.

Among Peter's many honors, he received the National Medal of Technology and Innovation in 1996. His most cherished award was from the City of Gloucester, Massachusetts, which recognized Peter for helping turn the city into a high-tech center from a one-industry fishing town, to the benefit of residents in the city and surrounding areas.

Peter was a gentleman who worked hard and played hard. Rather than raise his voice in anger, he would raise a glass in celebration. He was great fun to be with, both in and out of work. We and the semiconductor community miss him.

Andrew Wittkower

Soitec USA Inc

Rockport, Massachusetts

Geoffrey Ryding

Neutron Therapeutics Inc

Danvers, Massachusetts



Silvan Samuel Schweber

Silvan Samuel Schweber, who died on 14 May 2017 in Cambridge, Massachusetts, was a theoretical physicist by training and an accomplished historian of physics who contributed major works on the evolution of theoretical physics from James Clerk Maxwell through Richard Feynman.

Born in Strasbourg, France, on 10 April 1928, Schweber grew up in a Jewish family that soon felt the approaching